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Resistance oscillations and dephasing in ring patterns on InGaAs/InAlAs two-dimensional electron systems SHAOLA REN, J.J. HEREMANS, Virginia Tech, C.K. GASPE, S. VIJEYARAGUNATHAN, T.D. MISHIMA, M.B. SANTOS, University of Oklahoma — In InGaAs/InAlAs heterostructures with spin-orbit interaction, patterned into mesoscopic rings, we experimentally investigate low-temperature Aharonov-Bohm resistance oscillations. The oscillation amplitude was studied as function of applied current and temperature, to obtain the dependence of these parameters on dephasing. Previous results on mesoscopic quantum interferometers have shown a lobe structure in the dependence of the oscillation amplitude on measurement bias, in some models ascribed to Coulomb interaction, and have surmised a universal behavior with an energy scale dependent on interferometer size. The ring interferometers studied here were of typical radius of 700 nm, and lithographic arm width of 300 nm, similar-sized but of higher carrier density than in the previous studies, and used for similar bias- and temperature-induced dephasing studies. The measurements so far show the expected temperature dependence, but have not revealed the lobe structure in the bias dependence. We discuss the results in the light of dephasing phenomena expected in mesoscopic quantum interferometers (DOE DE-FG02-08ER46532, NSF DMR-0520550).

Shaola Ren
Virginia Tech

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